ConTeyor Multibag Systems N V

Flexible compartment system

The present invention concerns a flexible compartment system which comprises flexible webs which can be tensioned between frame elements such as for example rods or can be suspended therefrom, wherein intermediate portions which also comprise flexible web material are sewn to the tensionable or suspendable webs in such a way as to afford a compartment partitioning arrangement.

The state of the art discloses flexible compartment systems for fixing in frames, in particular in transport containers. Those flexible compartment systems permit the gentle transport of piece goods, for example automobile parts, in large numbers in a closed transport container. Compartment systems are known involving different forms of compartments or pockets, inter alia those comprising compartments which can be loaded from the ends of the transport containers. For such a flexible compartment system, flexible webs are fixed in a frame, for example tensioned between frame elements, wherein webs arranged in mutually superposed relationship are sewn to vertical intermediate portions which also comprise flexible material, thus affording compartments. Large interconnected flexible compartment systems are required for large transport containers. The production of large flexible compartments systems of that kind requires the use of machines of corresponding dimensions, such as for example sewing machines or welding apparatuses. Replacement of the conventional machines by such machines which are suitable for the production of large interconnected compartments systems is however very cost-intensive.

In comparison with that state of the art the object of the present invention is to provide large flexible compartment systems with an adequate number of compartments which can be produced in an inexpensive and time-saving fashion.

That object is attained in that a large flexible compartment system is constructed as a modular arrangement from a plurality of base elements with a smaller number of compartments, wherein the base elements are of such a configuration that they can be mutually connected together to form a larger unit.

That structure makes it possible to produce flexible compartment systems as modules for larger flexible compartment systems with a large number of compartments, using the conventional production machines and processes. No new machines have to be provided for production thereof. In addition the connection of a plurality of base elements to afford a flexible compartment system saves on production time in relation to the production of a large interconnected compartment system as smaller units of the compartment system can be more easily handled, that is to say aligned and fixed. In a damage situation, the modular structure also allows the replacement of individual base elements without having to replace the entire compartment system. The modular system is in particular also suitable for large mass production as it is possible to produce a large number of identical modules which can then be joined according to the respective customer wish to afford compartment systems of different sizes.

In a variant of the invention each base element is made up of four compartments. Such elements are already produced and sold for relatively small transport containers. In other respects it is advantageous if the base elements or modules according to the invention are specifically designed in such a way that they can be easily connected together alternately and possibly also in a number which in principle can be of any magnitude.

A desirable embodiment of the invention can be one in which the assembled base elements are all identical. The production of just one type of base element saves on time and cost.

In another preferred embodiment the lower flexible webs of the respective upper base elements do not have any fixing elements for the frame. That arrangement reduces the installation height of the compartment system and simplifies production of the base elements as, of two mutually butting flexible webs of two base elements which in any case are sewn together, only one web is fixed to the frame.

In addition, in this embodiment of the invention, it is appropriate if the base elements which are disposed in mutually superposed relationship are sewn together along the fixing elements for fixing to the frame or are joined together by means of hook-and-loop fasteners. That prevents the lowermost flexible web of the respective upper base element from slipping.

In a further preferred embodiment of the invention the flexible webs of the individual base elements are sewn at the sides to form loops. It is possible to fit through the loops holding rods with which the compartment system is fixed to the frame and tensioned.

In this embodiment of the invention, it is desirable if the uppermost and lowermost ones respectively of the flexible webs of two mutually abutting base elements are provided on both sides in each case only with loop halves which are sewn to the corresponding loop halves of the abutting flexible web to form one or more full loops. In that arrangement, both the lowermost flexible web of the upper base element and also the uppermost flexible web of the lower base element are held to the frame and tensioned. The loops of an upper and a lower web of mutually superposed base elements can also be mutually positioned in staggered relationship.

Alternatively the complete loops of two mutually superposed base elements can be sewn together in such a way that they form a full loop. If the loops are sewn together at their respective furthest projecting points that affords a loop of doubled material, after the sewing operation.

In a preferred embodiment of the invention the mutually superposed base elements are sewn together along the openings of the compartments, or are joined together by means of hook-and-loop fasteners. That ensures that, when loading the transport container, freight is not placed by mistake between two base elements. In addition the embodiment involving hook-and-loop fasteners permits rapid separation of the base elements after removal from the frame.

In a particularly preferred embodiment of the invention eyes or loops are additionally fixed to the upper or lower sides of the respective lowermost and uppermost webs of a compartment system assembled in a modular arrangement, through which eyes or loops can be passed tensioning rods which hold the compartment system in a vertical direction and tension it. That prevents sagging of the flexible webs upon being loaded with heavy articles.

Further advantages, features and possible uses of the present invention will be clearly apparent from the description hereinafter of preferred embodiments and the accompanying Figures in which:

Figure 1 shows a front view of a flexible compartment system,

Figure 2 shows a side view in section through a flexible compartment system,

Figure 3 shows a front view of a second embodiment of a flexible compartment system,

Figure 4 shows a side view in section through a second embodiment of a flexible compartment system,

Figure 5 shows a front view of a third embodiment of a flexible compartment system,

Figure 6 shows a three-dimensional view of the second embodiment, wherein the two mutually superposed base elements are not yet connected together,

Figure 7 shows a three-dimensional view of an alternative embodiment of the holding configuration of two mutually superposed base elements, and

Figure 8 shows a three-dimensional view of a further embodiment with an additional vertical tensioning rod.

Figure 1 shows a flexible compartment system comprising two identical base elements 4 and 21. Each base element is made up of horizontally tensioned flexible webs which are connected together by means of vertical intermediate portions 2 which also comprise flexible web material, so that four compartments 3 are formed. At the sides to the right and left of the compartments 3 the flexible webs 1, 16 and 17 are sewn to form loops 18 through which are passed tensioning rods 6 for fixing to the frame. The mutually superposed base elements 4 are provided with spacers 14 in the illustrated embodiment. In the illustrated embodiment the spacers 14 also comprise flexible web material which is folded in such a way that angles are produced, which are sewn together. The spacers are of such dimensions that they bridge over a spacing which makes it possible for both webs 16, 17 to be fixed with loops to fixing rods. The spacers 14 of the upper and lower base element respectively are sewn together. That can be particularly clearly seen from the side view in Figure 2 in which one of the seams 15 is diagrammatically illustrated along the openings of the compartments.

In this first embodiment, when connecting the base elements, the procedure can be such that firstly the spacers 14 on one of the two ends of the compartment system are sewn together in back-to-back relationship. Thereafter the two spacers are folded and the compartment systems are pivoted one on to the other. The connection between two base elements, which is diagrammatically shown in Figure 2, was produced in that

way. On the opposite end of the compartment system, fixing can then be effected for example by a procedure whereby the spacers 14 are folded outwardly, that is to say in such a way that they project beyond the end of the compartment system, and are thus accessible for sewing.

Figure 3 shows a second embodiment of the compartment system. It is also composed of two base elements 4' and 21' which each have four compartments 3'. It will be appreciated that embodiments of the invention are also possible, in which each base element has a number, adapted to the use involved, of compartments which are arranged in columns and rows, for example only one compartment, 1 x 10 compartments, 10 x 3 compartments, 50 x 80 compartments.

It can be clearly seen that the lowermost flexible web 16' of the upper base element 4' does not have any loops 18' for fixing to the tensioning rods 6. So that the lowermost web 16' of the upper base element 4' is also held within the frame, the lowermost web 16' of the upper base element 4' is sewn to the uppermost web 17' of the lower base element 21' parallel to the extent of the fixing loops, or is secured thereto by means of a hook-and-loop fastener. That can be particularly clearly seen from Figure 6 showing two base elements each having two compartments. The two base elements 4''', 21''' are not yet connected together in the Figure so that it can be clearly seen that the lowermost flexible web 16''' of the upper base element does not have any lateral loops. In contrast the uppermost web 17''' of the lower base element has two lateral loops 18'''. The seams 19''' parallel to the extent of the fixing loops 18''' for connecting the upper base element to the lower base element can be clearly seen in the form of broken lines.

In addition Figure 4 shows the connection of the upper and lower base elements 4' and 21' respectively by means of a hook-and-loop fastener 13' along the openings of the compartments. Besides slipping of the lower web 16' of the upper base element 4', that connection also ensures that freight is not inserted between the two base elements, when loading the shelf system. Instead of the hook-and-loop fastener 13' the connection can also be made by means of a double-sided adhesive tape.

Figure 6 also shows the fixing of the intermediate elements 2''' in this embodiment. The intermediate elements are respectively folded at their upper and lower ends and the resulting horizontal surfaces 20''' of the intermediate elements 2''' are sewn or glued to the upper and lower flexible webs 1''', 16''' and 17''' respectively.

Figure 5 shows a third embodiment according to the invention in which the lowermost flexible web 16" of the upper base element 4" and the uppermost flexible web 17" of the lower base element 21" are each provided with only one respective loop half 7" and 8" respectively. The two loop halves 7" and 8" are sewn together in such a way that they form a full loop through which a tensioning rod 6" is pushed. The base elements 4" and 21" which are connected together in that way are additionally connected together along the openings of the compartments by means of hook-and-loop fasteners 13". The hook-and-loop fastener 13" terminates in this embodiment with the cut edge of the webs 16" and 17".

As an alternative to the above-described options for fixing the base elements to the frame, Figure 7 shows an embodiment in which the fixing loops 18"" of the uppermost web 17"" and the lowermost web 16"" respectively of two mutually butting base elements 4"", 21"" are arranged in mutually displaced relationship in such a way that both the loops 18"" of the upper base element and also those of the lower base element can be fixed to a holding bar assembly. That manner of fixing, after removal of the holding bars, permits rapid separation of the individual base elements from each other.

Figure 8 shows a configuration of the invention which tensions the compartment system in a vertical direction. For that purpose, eyes 11"" are mounted to the lowermost flexible web 16"" in a position of prolonging the intermediate elements 2"". In the illustrated embodiment the eyes are formed by short flexible portions 20"" of the same material as the flexible webs being sewn to the lowermost flexible web 16"" and provided with holes 11"". As an alternative thereto the short portions 20"" can also comprise a stronger or thicker material than the flexible webs. A tensioning rod 6"" which is still shown outside the holes in the Figure is passed through the holes 11"". The tensioning rod 6"" is screwed to the frame 12"". As an alternative thereto for tensioning the compartment system it is also possible to use hooks of metal or plastic material which are riveted to the flexible webs.